

tions, references and synonymy full; the drawings, all by the author's own hand, may challenge comparison with those of Sullivant, and the lithography does them justice. This moss-flora is appropriately dedicated: "To the memory of the late William Wilson, the greatest of British Bryologists."—A. GRAY.

**Botanical Charts.**—For the benefit of any readers of the *GAZETTE* who are teachers of Botany I wish to give a brief description of a method of preparing botanical charts which may be of great service in illustration of the subject. While recognizing the fact that the only proper way to teach the science is by actual dissection and demonstration under the microscope I also know the fact that many have to teach botany in the best way they can without microscopes. Even to those whose departments are well supplied these charts may be helpful in illustrating a course of lectures, in the class room or to popular audiences. I have never seen anything similar in use and believe that they are here first described.

Prof. L. S. Thompson in charge of the Department of Industrial Art of Purdue University after considerable experimenting to find a cheap, easily-made and convenient chart for use in his class-room has determined upon this form as being in every way the best. Seeing them there I have constructed a number for use in botanical instruction. By his permission I here describe them hoping they may be of use in the sciences as well as in art.

Sheets of strong smooth manilla paper (the quality used for genus covers is the best but a little more expensive than necessary) 40x48 inches are to be had at any book store or paper house. These cut along the fold make a convenient size 24x40 or if larger is wanted a sheet 36x48 left uncut is most suitable. On these the illustrations to be used may first be sketched in pencil and then completed in India ink. Crayon may be used and if it shows any tendency to blur (as it usually does when handled) may be sprayed with a solution of shellac in alcohol by means of an atomizer. As this is troublesome India ink is preferable. Very frequently students with time and talent enough can either do the whole of the work or the preliminary sketching. Experience will dictate the best illustrations, such as Figs. 123, 219, 224 and 565 in Gray's *Structural Botany*; 18 a, 26 and 77 from Sachs and 53 73 and 302 from Bessey are easily put on and serve a good turn in demonstration.

Having completed a sufficient number of charts procure the round pine sticks used for curtain rollers, a shoemaker's eyelet punch and fastener, a few eyelets and a few small screws. Along the top edge of a series of charts (twenty five is a convenient number) punch four or five holes, insert and fasten the eyelets and you have them securely bound together. It is well, to prevent the tearing off of the outer chart, to fasten in the holes small bits of tin thus giving greater bearing surface to the rim of the eyelet. Now with the small screws fasten the bunch to the roller and the work is done.

For supporting these charts a light frame tripod with a cross piece at the top furnished with hooks at suitable distances to catch into corres-



ponding "eyes" on the roller is used. As the under charts are wanted the upper ones can be thrown over the top and out of the way.

A word in regard to the preparation of the India ink. If you follow the ordinary directions, viz: to rub down the quantity needed in a porcelain dish, after grinding away till your arms ache, you will have enough perhaps to outline one illustration and probably half of that will evaporate before you are ready to use it. Instead, take about half a stick break it into pieces the size of a grain of wheat and allow it to soak over night in just enough water to cover it. When you are ready to use dilute until it will just leave a perfectly black mark. If at all lumpy rub to a smooth paste with a flat ended stick. Apply with a camel's hair or sable brush—one tapering to a fine point will be found easiest to handle. Let me assure any who care to attempt the manufacture that it takes very little artistic talent, very little time and very little trouble to produce results that will astonish the maker. (No sarcasm) These charts are cheap, portable and efficient; qualities possessed by none of the more elaborate ones of the publishers. I shall be glad to give any further details of construction if any one so desires.—C. R. BARNES, *Purdue Univ., LaFayette, Ind.*

**The Flora of Essex County, Massachusetts**, John Robinson, Essex Institute, Salem, 1880.—An elegant Catalogue of 200 pages. Those who are familiar with Prof. Robinson's methods will not need to be told that this Catalogue is a most thorough and admirable work. No finer Catalogue has been published since Paine's model catalogue of the plants of Oneida County, N. Y., and could the lamented Oakes, to whose memory it is so gracefully dedicated, have lived to see this tribute to the flora of a region "where he was born, and where he loved to botanize," his pleasure would have been very great indeed.

Tracy's modest "Studies of the Essex Flora" was only partial in its character, being limited to the vicinity of Lynn, and containing only the flowering plants of that region; but the present Catalogue covers the entire County, and contains the lower, as well as the higher orders of plants.

Combining within her limits sea shore and wood land of varied character, Essex County offers rare attractions to a botanist, and how well sea-shore and wood land, meadow and hill have been gleaned for treasures this splendid record attests. 1694 species and 140 varieties are enumerated representing 115 orders.

The remarkable resemblance between the wood lands of Essex and those of New Hampshire has often been noticed by visiting botanists, and it is not surprising to find recorded here many plants common to both regions.

The writer has passed many pleasant hours in the Essex woods with the author, the recollection of which he will long cherish, and it gives him much pleasure now to bear witness to the zeal and fidelity with which the author has devoted himself to this work of the "Essex Flora," the completeness with which it has been consummated, and the very elegant form in which it is presented.

Full credit is given to all who have aided the author in any way,



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